

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,423,337 B1
APPLICATION NO. : 10/707208
DATED : September 9, 2008
INVENTOR(S) : Patwardhan et al.

Page 1 of 2

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Face of the Patent:

(75) **Inventors:** Change "Nikhil K. Kelhar" to --Nikhil V. Kelhar--.

In the Specification:

Column 6, after line 39, insert --Referring to FIG. 5C, the semiconductor die of FIG. 5B is shown as being permanently attached to a substrate, such as PCB 120, in accordance with one embodiment of the present invention. As illustrated, a single die 100 has been aligned with contacts on a PCB 120 and permanently attached through the reflowing of the solder bumps of the die and the solder paste of the PCB to form multiple solder joint connections 130. Because of the presence of the sufficiently rigid support coating 160, however, the shape of each solder joint 130 is substantially constrained in comparison with a typical solder joint 30, as seen in FIGS. 2C and 3. As indicated above, the support coating 160 has provided structural support to the solder bumps 112 during the reflow process, such that the extent of the collapse of the solder joints has been constrained. In addition, the support coating 160 is also able to provide structural support to the subsequent solder joint connections 130.--.

Col. 6, line 46, delete "tie".

Col. 6, beginning at line 62 and ending with Col. 7, line 14, delete
"Continuing on to FIG. 6, a particular solder joint between the PCB and semiconductor die with a sufficiently rigid support coating of FIG. 5C is similarly illustrated in side cross-sectional view. Compared to the conventional solder joint 30 of FIG. 3, the solder joint 130 of FIG. 6 is superior in several ways. One significant improvement can be

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found in the wetting angle 131 between the solder joint 130 and the die 100. If the height of the support coating is at about fifty percent of the original solder bump height, the final wetting angle 131 is typically between 50 and 60 degrees, which is markedly better than the normally resulting angle of about 25 to 35 degrees. In some instances, the final wetting angle 131 is almost equal to the pre-collapse angle between the original solder bump 112 and die 100. In any event, this significant increase in the final wetting angle substantially increases the structural strength of the formed solder joints, which improves solder joint reliability and lifespan under temperature cycling. In fact, preliminary experimental results indicate that reliability and lifespan are at least doubled for solder joints in dice having a sufficiently rigid support coating.”

Signed and Sealed this

Twenty-fifth Day of November, 2008

A handwritten signature in black ink, appearing to read "Jon W. Dudas". The signature is stylized with a large, looping initial "J" and a distinct "D".

JON W. DUDAS
Director of the United States Patent and Trademark Office